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Occupational psychosocial hazards among the emerging U.S. green collar workforce

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Abstract

Objective—To compare occupational psychosocial hazards in green collar versus non-green collar workers.

Methods—Standard Occupational Classification codes were used to link the 2010 National Health Interview Survey to the 2010 Occupational Information Network Database. Multivariable logistic regressions were used to predict job insecurity, work-life imbalance, and workplace harassment in green versus non-green collar workers.

Results—Most participants were white, non-Hispanic, 25–64 years of age, and obtained greater than a high school education. The majority reported not being harassed at work, no work-life imbalance, and no job insecurity. Relative to non-green collar workers (n=12,217), green collar workers (n=2,588) were more likely to report job insecurity (OR=1.13; 95% CI=1.02–1.26) and work-life imbalance (1.19; 1.05–1.35), but less likely to experience workplace harassment (0.77; 0.62–0.95).

Conclusions—Continuous surveillance of occupational psychosocial hazards is recommended in this rapidly emerging workforce.

Keywords

job insecurity; workplace harassment; work-life imbalance; green collar worker; Occupational Information Network Database; National Health Interview Survey

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Introduction

There is substantial evidence linking occupational psychosocial hazards to several negative outcomes.[1–10] Key psychosocial hazards that have been discussed at length in the occupational health literature include: job insecurity, workplace harassment, and work-life imbalance.[3,5,11,12] Job insecurity occurs when employees are unsure as to the stability of their jobs in the future, often due to a poor economy or non-permanent roles.[13] Work-life imbalance transpires when an individual cannot meet their work and family commitments due to long hours, high work intensity and/or pressure.[14] Workplace harassment encompasses a variety of behaviors, including discrimination, bullying, threatening, and abuse.[15] Workers exposed to these psychosocial hazards are at higher risk of developing mental (e.g., depression) and physical health issues (e.g., cardiovascular disease), ultimately impacting their careers (e.g., job turnover).[16–18] Unfortunately, there has been little attention to these psychosocial hazards in the "green collar" workforce in the U.S., despite the rapid emergence of this new sector and the importance of these factors in maintaining optimal health.[8–10,19]

"Green collar" jobs are defined as those that involve protecting wildlife or ecosystems, reducing pollution/waste, and/or reducing energy usage and lowering carbon emissions.[19–22] This novel workforce includes the creation of new jobs that contribute to environmental sustainability and protection, but it also involves the "greening" of existing occupations. According to the National Center for O*NET Development, "the greening of occupations refers to the extent to which green economy activities and technologies increase the demand for existing occupations, shape the work and worker requirements needed for occupational performance, or generate unique work and worker requirements."[23] A comprehensive description of the green economy, its occupations, and related references are described in detail elsewhere.[21,22,24]

Similar to non-green collar workers, green collar jobs include workers from all occupation categories (i.e., white collar, blue collar, service, and farm) and sectors (renewable energy generation; transportation; energy efficiency; green construction; energy trading; energy and carbon capture and storage; research, design, and consulting services; environment protection; agriculture and forestry; manufacturing; recycling and waste reduction; governmental and regulatory administration) in the economy.[21,22,24] Consequently, green collar jobs encompass a wide variety of occupations, ranging from high-skilled, high-income professionals (e.g., CEO of an environmental-friendly organization) to low-skilled low-income manual laborers (e.g., roofers installing solar panels on a building). More detailed information describing this workforce (e.g., job tasks, education/skills needed, technology used, wages and employment opportunities, work context, job titles, etc.) can be found online (http://www.onetonline.org/find/green) and in Appendix 1.

There is no nationally representative surveillance system that describes the characteristics, exposures, or health status of green collar workers in the U.S. To fill this gap in the literature, our research team conducted a linkage between the National Health Interview Survey (NHIS)[25] and the U.S. Occupational Information Network (O*NET).[26] This linkage (described in detail below) revealed that green collar workers represented approximately

20% of NHIS participants as being employed in a green collar job. The vast majority of these workers are male (76%), aged 25–64 years (87%), non-Hispanic (86%), White (83%), and work in the private sector (84%).[27] As illustrated in Appendix 1, we found that the majority of green collar workers were either white (48%) or blue collar (52%). Results from this linkage, including a more detailed description of green collar workers, including their occupational exposures, are described in upcoming publications (currently under review).[27–31] In the current study, we will use this linked data to compare psychosocial hazards (work-life imbalance, job insecurity, and workplace harassment) in green collar versus non-green collar workers.

Materials and Methods

Data Sources

Data were obtained from the 2010 National Health Interview Survey (NHIS) Occupational Supplement[32] and the 2010 Occupational Information Network online (O*NET) database, version 19.0.[33] The NHIS is a continuous probability household survey of U.S. non-institutionalized population utilizing a multi-stage, clustered, sample design. This nationally-representative survey has been administered annually since 1957 by the National Center for Health Statistics. In addition to a wide range of self-reported demographic and health data (e.g., medical conditions, morbidity, mortality, health-related behaviors), the NHIS contains substantial individual-level information on occupation. The NHIS utilizes Standard Occupational Classification (SOC) system to classify job titles, allowing for linkages with other databases that use the same SOC codes (e.g., O*NET). Specifically, the 2010 NHIS Occupational Supplement included an expanded series of occupational-specific questions, such as more detailed information on workplace exposures and work-related conditions.[34]

The O*NET is a publicly available online resource funded by the U.S. Department of Labor Employment, and Training Administration. It provides up-to-date contextual information on over 900 jobs (categorized by O*NET-SOC codes) in the U.S. For these jobs, O*NET contains data on the typical work environment, knowledge/skills/education requirements of workers, workplace exposures, and other occupation-specific information.[33] O*NET also classifies specific occupations according to whether it is “green collar” or “non-green collar”. To do so, it first determines the tasks for each job (see http://www.onetcenter.org/dl_files/GreenTask_Summary.pdf for more details). If a job has at least one “green” task (e.g., whether it provides green services or produces green goods), then it is categorized as a “green collar” job. It is important to note that this categorization includes a diverse range of jobs, including those with few green tasks (e.g., personal financial advisors who may advise clients on an eco-friendly investments) to those with exclusively green tasks (e.g., solar panel installers).

NHIS and O*NET Linkage

To protect NHIS participant confidentiality, data linkage and analyses were conducted at the Research Data Center (RDC) of the National Center for Health Statistics (NCHS). Linking the publicly available NHIS data with the green collar classification in O*NET occurs through the 4-digit occupational code variable (OCCUPN) in the NHIS (i.e., digits 3 4 5 6)

and the 8-digit O*NET SOC code (i.e., 1 2 3 4 5 6). In the case when the O*NET SOC code had a seventh and eighth digit ending in .00, this was considered an exact match with the NHIS data and labeled as green or non-green. However, when the seventh and eighth digit had an extension beyond .00, such as .01, .02, etc., we further investigated if each of these detailed occupations were all green, all non-green, or "mixed-green" collar workers. For example, if an O*NET broad occupational group had three different extensions of the seventh and eighth digit codes (e.g., .01, .02, and .03) of which two were classified as green and one was classified as non-green, then the NHIS occupational code was labeled as mixed-green to indicate that the parent job title had mixed jobs. For the current analysis, mixed-green collar workers (n=1,005; 6.8%) were excluded.

Survey Variables

The dependent variables obtained from the NHIS were job insecurity, work-life imbalance, and workplace harassment. Job insecurity and work-family imbalance were measured by the following questions: *"Please tell me whether you: strongly agree, agree, disagree, or strongly disagree with each of these statements: 'I am worried about becoming unemployed' and 'It is easy for me to combine work with family responsibilities,'"* respectively. Responses of "*strongly agree*" and "*agree*" were defined as "job insecurity" for the first statement; and responses of "*strongly disagree*" and "*disagree*" were defined as "work-family imbalance" for the second statement. "Workplace harassment" was defined as participants answering "*yes*" to the question: "*During the past 12 months, were you threatened, bullied, or harassed by anyone while you were on the job?*" All dependent variables were dichotomized (yes/no).

The main independent variable was green collar worker status (i.e., green collar or non-green collar), obtained from the O*NET. Other independent variables that were acquired from the NHIS included: age (18–44, 45–64 or 65+ years), gender (male or female), race (black, white, or other), ethnicity (Hispanic or non-Hispanic), and educational attainment (less than high school, high school, or more than high school education).

Statistical Analyses

Based on the NHIS, all currently working individuals (18+ years of age) or those who have worked in the week prior to the interview were included in the analytic sample. Employment status (i.e., employed vs. non-employed) was specified as a dichotomous variable based on the question, "What is your correct working status?" Three multivariable logistic regression models, controlling for the independent variables listed above, were employed to predict job insecurity, work-life imbalance, and workplace harassment in green collar versus non-green collar workers.[35] All statistical analyses took into account complex survey design and were conducted with SAS version 9.3.[35]

Results

Demographic and Psychosocial Information

As illustrated in Table 1, there were a total of 14,805 workers (green collar n = 2,588; non-green collar n = 12,217). The majority of green collar workers were male (76.3%), 25–64

years of age (87.2%), white (83.7%), non-Hispanic (85.6%), and had obtained greater than a high school education (60.8%). Further, the majority of green collar workers did not experience workplace harassment (94.4%), job insecurity (65.6%), or work-life imbalance (82.1%).

Most non-green collar workers were female (52.2%), 25–64 years of age (82.3%), white (81.6%), non-Hispanic (85.7%), and had obtained greater than a high school education (66.8%). Further, the majority of non-green collar workers did not experience workplace harassment (92.2%), job insecurity (69.0%), or work-life imbalance (84.0%).

Multivariable Logistic Regression

Multivariable logistic regression analyses indicated that relative to non-green collar workers, green collar workers were more likely to report job insecurity (Odds Ratio [OR] = 1.13; 95% Confidence Interval [95% CI] = 1.02 – 1.26) and work-life imbalance (OR = 1.19; 95% CI = 1.05 – 1.35), but less likely to experience workplace harassment (OR = 0.77; 95% CI = 0.62 – 0.95), relative to non-green collar workers (Table 2).

Discussion

The current study utilized data from an innovative linkage between the 2010 O*NET database and the 2010 NHIS Occupational Supplement to describe key occupational psychosocial hazards of the emerging green collar workforce. Findings indicated that relative to non-green collar workers, green collar workers were significantly more likely to report job insecurity and work-life imbalance, but less likely to experience workplace harassment. It is interesting to note that there were significant differences between green and non-green collar workers in all three psychosocial exposures. These findings illustrate the importance of categorizing green collar workers as a distinct workforce, perhaps requiring unique approaches to minimize their exposure to these psychosocial occupational hazards.

Work Life Imbalance

Green collar workers reported more work-life imbalance than non-green workers suggesting that green collar workers had difficulty combining work and family responsibilities with ease. Work-life imbalance has been linked to individual-, family- and organizational-level domains.[11,14,36] However, there is debate in the occupational health literature regarding directionality of this association.[14,16] For example, do work stressors cause family stress or do family stressors cause work stress? Given the cross-sectional design of this study, temporality of this association cannot be determined. Because work-life imbalance negatively affects one’s well-being and job satisfaction,[37] future research should examine reasons green-collar workers report this imbalance, and pursue modified workplace policies as appropriate (e.g., day care, flexible schedules, telecommuting options).[38] If green-collar workers have a more fulfilling life outside of work, they might have decreased burnout rates and job insecurity.[38]

Job Insecurity

Similar to work-life imbalance, green collar workers reported higher rates of job insecurity compared to non-green collar workers. Given the global economic uncertainty, fast pace of technological change, and relative novelty of the green collar workforce, these findings are not surprising.[39] Further, the development of new occupational sectors has historically led to restructuring of the workforce (both within and across sectors), increased occupational demands (e.g., retraining, learning new skills, modification of existing job tasks), and changes in policies and regulatory requirements.[39] These factors can increase job insecurity, leading to several detrimental consequences (e.g., job turnover, and poor physical and mental health).[40] Given the causes and effects of job insecurity has not been examined in green collar workers, future research among this understudied occupational group is warranted.

Workplace Harassment

The results also indicated that green collar workers experience less workplace harassment compared to non-green collar workers, which is protective of their health status given that psychological violence represents a major threat to long-term worker health and job performance.[41,4241–43] It is possible that because green collar workers fear losing their job due to higher job insecurity, negative behaviors on the job are decreased. Further, the lower rates of workplace harassment in green collar workers may be a result of underreporting and fear of retaliation.[44]

Strengths and Limitations

The NHIS and O*NET both have strengths and limitations that should be noted when interpreting results. The NHIS is a nationally representative survey of the U.S. civilian population. This yielded a large sample of workers, which provided a unique opportunity to collect detailed individual-level information. However, the NHIS is limited by its cross-sectional design and self-reported nature, potentially leading to temporality and recall biases. A strength of the O*NET is that is provides consistently updated occupational information on over 900 jobs in the U.S. However, all O*NET data are ecological in nature; therefore, we cannot make conclusions about individual green collar workers based only on the analyses of this group-level data (i.e., ecological fallacy). Finally, given the NHIS and O*NET contain occupational information on the U.S. workforce, results should not be generalized to workers in other countries.

There are also some limitations with the measurement of study variables that should be noted. First, green collar jobs are considered a new industry sector that is rapidly transitioning; therefore, exposure misclassification (i.e., green collar worker status) is a potential issue, which may lead to biased odds ratio estimates. As the green collar workforce is further studied, these categorizations will likely become more defined. Once these groupings are better described, future researchers may consider examining whether the association between green collar worker status and occupational psychosocial hazards is moderated by the number of green tasks. Second, it is well known that occupational psychosocial hazards are difficult to define and measure given their subjective and complex nature.[4,11,36] As a result, there is no consistently used operational definition or assessment

tool used to study these hazards, making comparisons between studies difficult.[4,11,36] Future studies may benefit from using validated in-depth interviews, as well as external information (e.g., personnel files), collected on a longitudinal basis.[36] It would also be helpful to measure the individual's appraisal of the hazard and his/her coping response, given these are important moderators when studying stress response.[45,46] It would also be interesting to examine the synergistic effects of these psychosocial hazards on health and work-related outcomes in different occupational sectors. Collectively, this additional information will help gain a more comprehensive understanding of the causal mechanisms surrounding these psychosocial hazards, as well as their long-term consequences.[11]

Conclusions

The current study utilized data from an innovative linkage between the 2010 O*NET database and the 2010 NHIS Occupational Supplement to describe the occupational psychosocial hazards of the emerging green collar workforce. Findings indicated that relative to non-green collar workers, green collar workers were significantly more likely to report job insecurity and work-life imbalance, but less likely to experience workplace harassment. As the psychosocial work environment has been linked to a broad variety negative outcomes, continuous surveillance of this new generation of workers is recommended that includes direct assessment of green job tasks.[2,6,7,47] With more in-depth surveillance, protective interventions and company policies can be implemented to minimize these occupational psychosocial hazards and to maximize worker health and productivity.

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Appendix 1. Green collar job titles by Krieger job category: National Health Interview Survey (2004–2012) and Occupational Information Network Database Linkage: N=27,338)

Krieger Category	Job Title	n	%
White Collar (n=13,063; 47.78%)			
	Aerospace engineers	139	0.51
	Agricultural and food scientists	34	0.12
	Architects, except naval	172	0.63
	Atmospheric and space scientists	13	0.05
	Biological scientists	121	0.44
	Chemical engineers	52	0.19
	Chemical technicians	76	0.28
	Chemists and materials scientists	85	0.31
	Civil engineers	308	1.13
	Computer software engineers	991	3.62
	Construction and building inspectors	13	0.05
	Construction managers	771	2.82
	Customer service representatives	2142	7.84
	Designers	748	2.74
	Dispatchers	297	1.09
	Driver/sales workers and truck drivers	7	0.03
	Electrical and electronics engineers	290	1.06
	Engineering managers	85	0.31
	Environmental engineers	54	0.20
	Environmental scientists and geoscientists	80	0.29
	Financial analysts	100	0.37
	First-line supervisors/managers of mechanics, installers, and repairers	6	0.02
	First-line supervisors/managers of production and operating workers	10	0.04
	General and operations managers	743	2.72
	Human resources, training, and labor relations specialists	569	2.08
	Industrial production managers	242	0.89
	Inspectors, testers, sorters, samplers, and weighers	16	0.06
	Laborers and freight, stock, and material movers, hand	9	0.03
	Lawyers, Judges, magistrates, and other judicial workers	837	3.06
	Marketing and sales managers	738	2.70
	Mechanical engineers	208	0.76
	Natural sciences managers	11	0.04
	News analysts, reporters and correspondents	88	0.32
	Nuclear engineers	12	0.04

Krieger Category	Job Title	n	%
	Other education, training, and library workers	127	0.46
	Other healthcare practitioners and technical occupations	65	0.24
	Other life, physical, and social science technicians	98	0.36
	Personal financial advisors	327	1.20
	Production, planning, and expediting clerks	269	0.98
	Public relations specialists	90	0.33
	Purchasing agents and buyers, farm products	10	0.04
	Sales representatives, wholesale and manufacturing	1239	4.53
	Shipping, receiving, and traffic clerks	579	2.12
	Urban and regional planners	38	0.14
	Wholesale and retail buyers, except farm products	154	0.56
Service (n=26; 0.10%)			
	Customer service representatives	6	0.02
	First-line supervisors/managers of mechanics, installers, and repairers	6	0.02
	Fish and game wardens	9	0.03
	Maintenance and repair workers, general	5	0.01
Farm (n=40; 0.15%)			
	Agricultural inspectors	25	0.09
	Forest and conservation workers	15	0.05
Blue Collar (14,209; 51.98%)			
	Aircraft structure, surfaces, rigging, and systems assemblers	22	0.08
	Boilermakers	12	0.04
	Bus and truck mechanics and diesel engine specialists	298	1.09
	Bus drivers	638	2.33
	Cement masons, concrete finishers, and terrazzo workers	84	0.31
	Chemical processing machine setters, operators, and tenders	46	0.17
	Computer control programmers and operators	63	0.23
	Construction and building inspectors	89	0.33
	Construction laborers	1406	5.14
	Construction managers	21	0.08
	Crushing, grinding, polishing, mixing, and blending workers	96	0.35
	Customer service representatives	5	0.01
	Cutting, punching, and press machine setters, operators, and tenders, metal and plastic	113	0.41
	Derrick, rotary drill, and service unit operators, oil, gas, and mining	28	0.10
	Driver/sales workers and truck drivers	2946	10.78
	Electrical and electronics repairers, industrial and utility	11	0.04
	Electrical power-line installers and repairers	125	0.42
	Electrical, electronics, and electromechanical assemblers	196	0.72

Krieger Category	Job Title	n	%
	Electricians	469	1.72
	Engine and other machine assemblers	22	0.08
	First-line supervisors/managers of mechanics, installers, and repairers	266	0.97
	First-line supervisors/managers of production and operating workers	723	2.65
	Hazardous materials removal workers	37	0.14
	Helpers, construction trades	66	0.24
	Helpers--installation, maintenance, and repair workers	22	0.08
	Industrial and refractory machinery mechanics	421	1.54
	Industrial truck and tractor operators	546	2.00
	Inspectors, testers, sorters, samplers, and weighers	795	2.91
	Insulation workers	53	0.19
	Laborers and freight, stock, and material movers, hand	1640	6.0
	Locomotive engineers and operators	33	0.12
	Machinists	341	1.25
	Maintenance and repair workers, general	393	1.44
	Millwrights	40	0.15
	Mining machine operators	44	0.16
	Miscellaneous assemblers and fabricators	1049	3.84
	Miscellaneous construction and related workers	24	0.09
	Miscellaneous plant and system operators	29	0.11
	Operating engineers and other construction equipment operators	322	1.18
	Power plant operators, distributors, and dispatchers	39	0.14
	Rail-track laying and maintenance equipment operators	9	0.03
	Railroad conductors and yardmasters	41	0.15
	Refuse and recyclable material collectors	88	0.32
	Roofers	167	0.61
	Sheet metal workers	132	0.48
	Shipping, receiving, and traffic clerks	10	0.04
	Stationary engineers and boiler operators	83	0.30
	Structural iron and steel workers	73	0.27
	Structural metal fabricators and fitters	33	0.12

Table 1

Description of green-workers (n=2,588) and non-green collar workers (n=12,217).

Characteristic	Green Collar Workers		Non-Green Collar Workers	
	n	%	n	%
Male	1,900	76.3	5,406	47.8
Female	688	23.7	6,811	52.2
White	2,018	83.7	9,206	81.6
Black	365	10.6	1,984	11.8
Other	205	5.7	1,027	6.6
18–24	210	9.2	1,349	13.6
25–64	2,279	87.2	10,273	82.3
65+	99	3.7	595	4.2
Non-Hispanic	2,110	85.6	9,755	85.7
Hispanic	478	14.4	2,462	14.3
> High School	1,537	60.8	7,942	66.8
High School	731	29.3	2,843	23.7
< High School	310	10.0	1,403	9.5
Workplace Harassment	151	5.6	970	7.8
No Workplace Harassment	2,433	94.4	11,207	92.2
Job Insecurity	914	34.4	4,041	31.0
No Job Insecurity	1,670	65.6	8,113	69.0
Work-Life Imbalance	461	17.9	1,993	16.0
No Work-Life Imbalance	2,119	82.1	10,153	84.0

Table 2

Multivariable logistic regression analyses predicting psychosocial stressors by green collar worker status: The 2010 NHIS Occupational Health Supplement and O*Net Linkage

Independent Variable	Work-Life Imbalance (n=14,690)	Workplace Harassment (n=14,725)	Job Insecurity (n=14,702)
	OR; 95% CI	OR; 95% CI	OR; 95% CI
Green-Collar	1.19; 1.05–1.35*	0.77; 0.62–0.95*	1.13; 1.02–1.26*
Sex: Male vs. Female	0.90; 0.81–0.99*	0.72; 0.61–0.83*	1.06; 0.96–1.16
Age			
65+ vs. 18–44	0.33; 0.21–0.50*	0.37; 0.22–0.64*	0.36; 0.27–0.47*
45–64 vs. 18–44	0.91; 0.81–1.02	1.07; 0.91–1.25	1.19; 1.08–1.30*
Race			
Other vs. White	0.96; 0.80–1.16	0.72; 0.54–0.96*	1.31; 1.11–1.54*
Black vs. White	1.20; 1.04–1.39*	0.96; 0.77–1.19	1.29; 1.14–1.45*
Hispanic Ethnicity	0.91; 0.78–1.07	0.10; 0.80–1.24	1.90; 1.71–2.10*
Education			
< HS vs. > HS	0.92; 0.76–1.10	0.75; 0.54–1.04	1.90; 1.64–2.12*
= HS vs. > HS	0.93; 0.82–1.05	1.12; 0.94–1.35	1.36; 1.22–1.51*

Note. Differences in sub-total population sample due to item non-response or missing;

*p<0.05